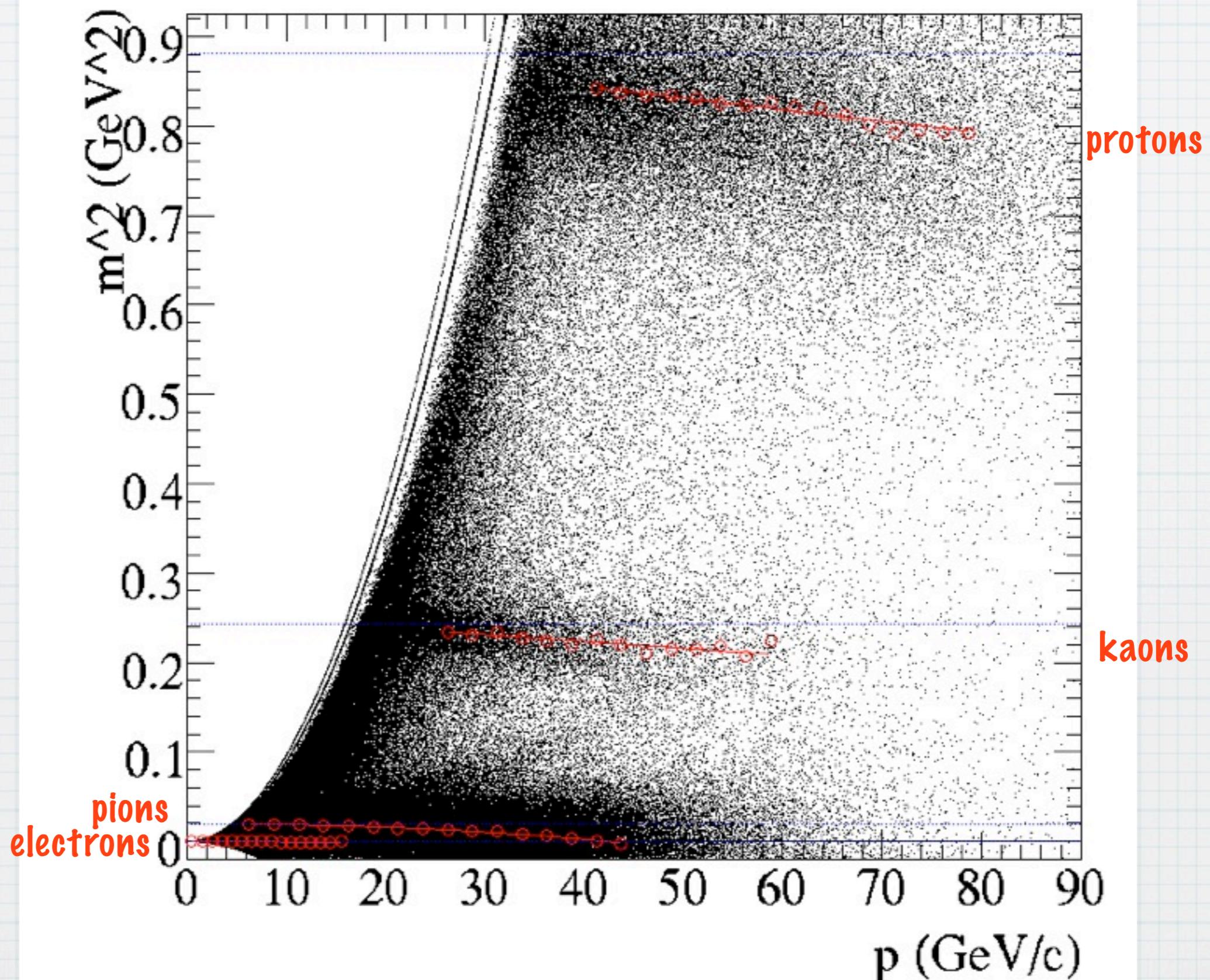


I've been working to calibrate the RICH measured mass-squared distributions. Currently, the peak locations in both data and MC do not correspond to the correct values and there is a significant momentum dependence in the peak locations. I will present a calibration procedure which removes both of these. Having these distributions calibrated to the correct values will aid in data-MC comparisons as chi-squared differences due to data/MC differences in PID performance will be lessened and the PID resolution will be improved in any distribution which integrates over momentum.

The result of this work is a function which takes the "raw" rich mass-squared as input along with the track pt and pz and outputs a calibrated mass-squared :

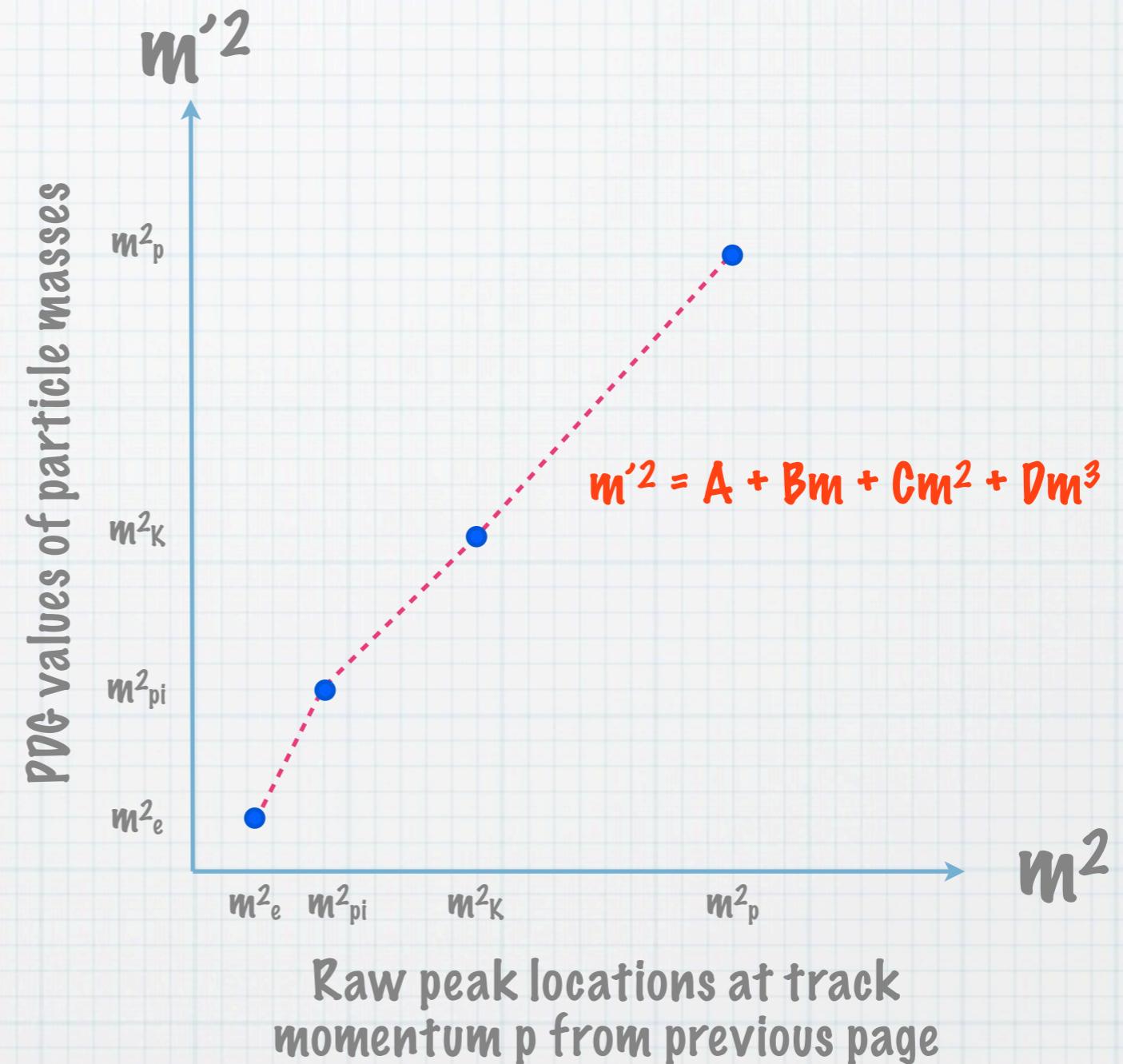
mcalib = mrichd(pt, pz, mrich)

"Raw" RICH m^2 vs Momentum : NuMI Data

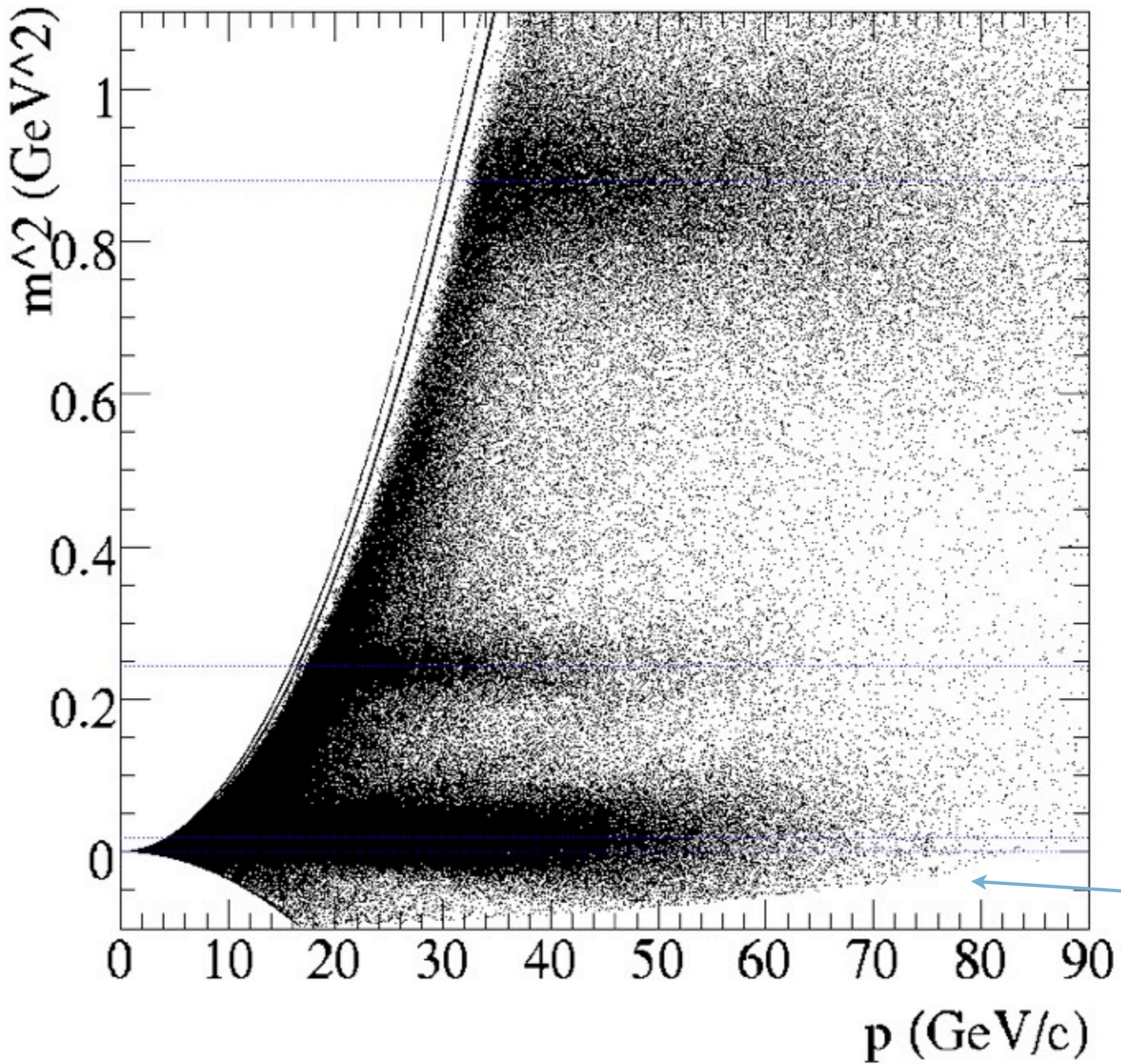


Calibration function

Using the fits to the peak locations from the previous plot, for any momentum p I can find the raw peak locations for e , π , K , and p . I can solve analytically for the parameters A, B, C, D of a third order polynomial which will interpolate between these. For any track whose raw mass-squared is m^2 and whose momentum is p I can use the polynomial to compute a calibrated mass-squared m'^2 which will have its peaks in the correct locations. This will be done separately for data and MC. At the moment, only the data has been done as this analysis will need to be redone after the momentum scale corrections have been applied.



Calibrated RICH m^2 vs Momentum : NuMI Data



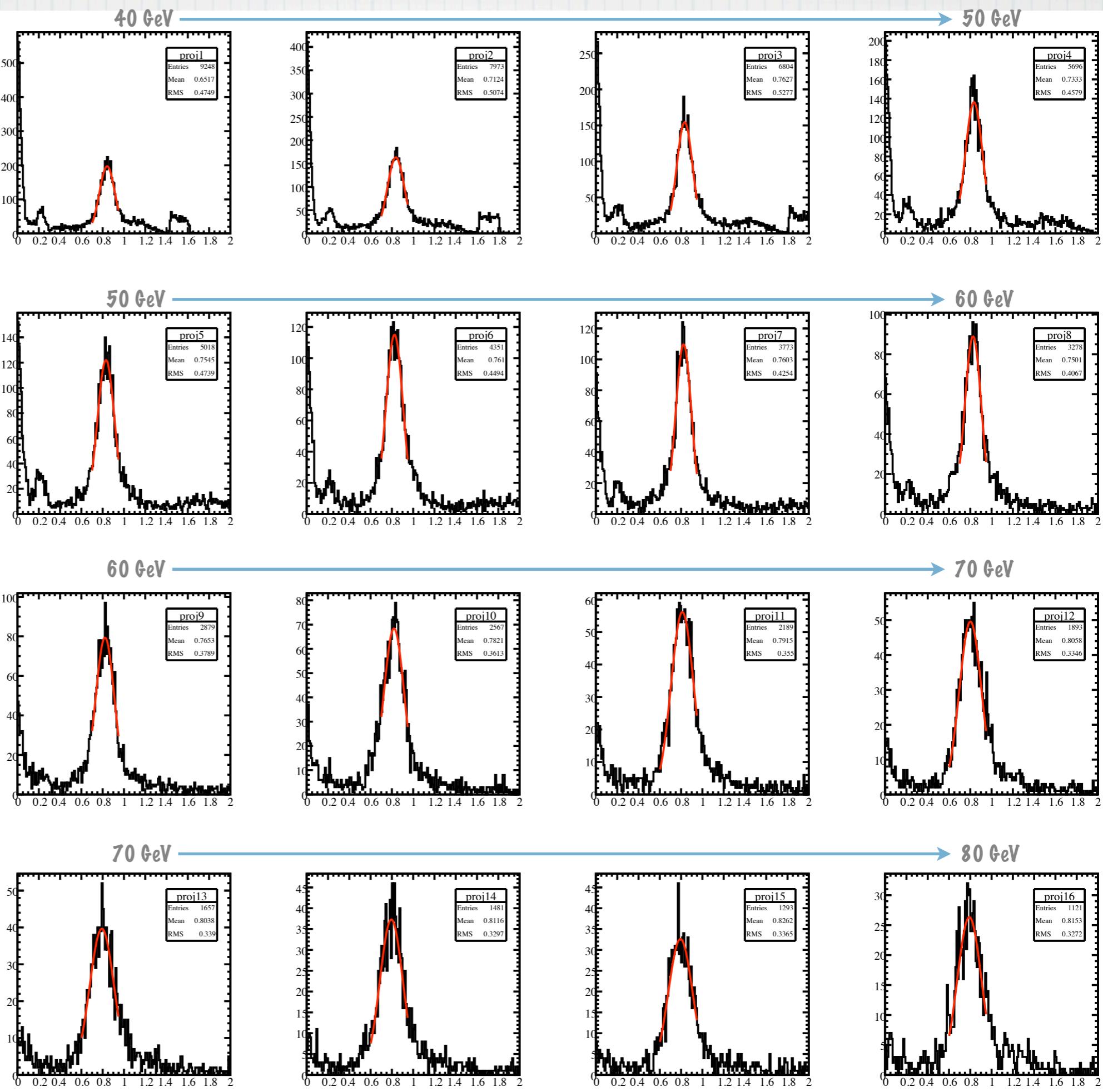
Still To Do:

- Extend the lever arm for pions to reduce upturn at high momentum
- Rerun once the momentum scale corrections are finalized
- Run the MC
- Incorporate into the NUMI udst

The following plots show the mass peaks used to extract the raw central peak values. I've included them for completeness.

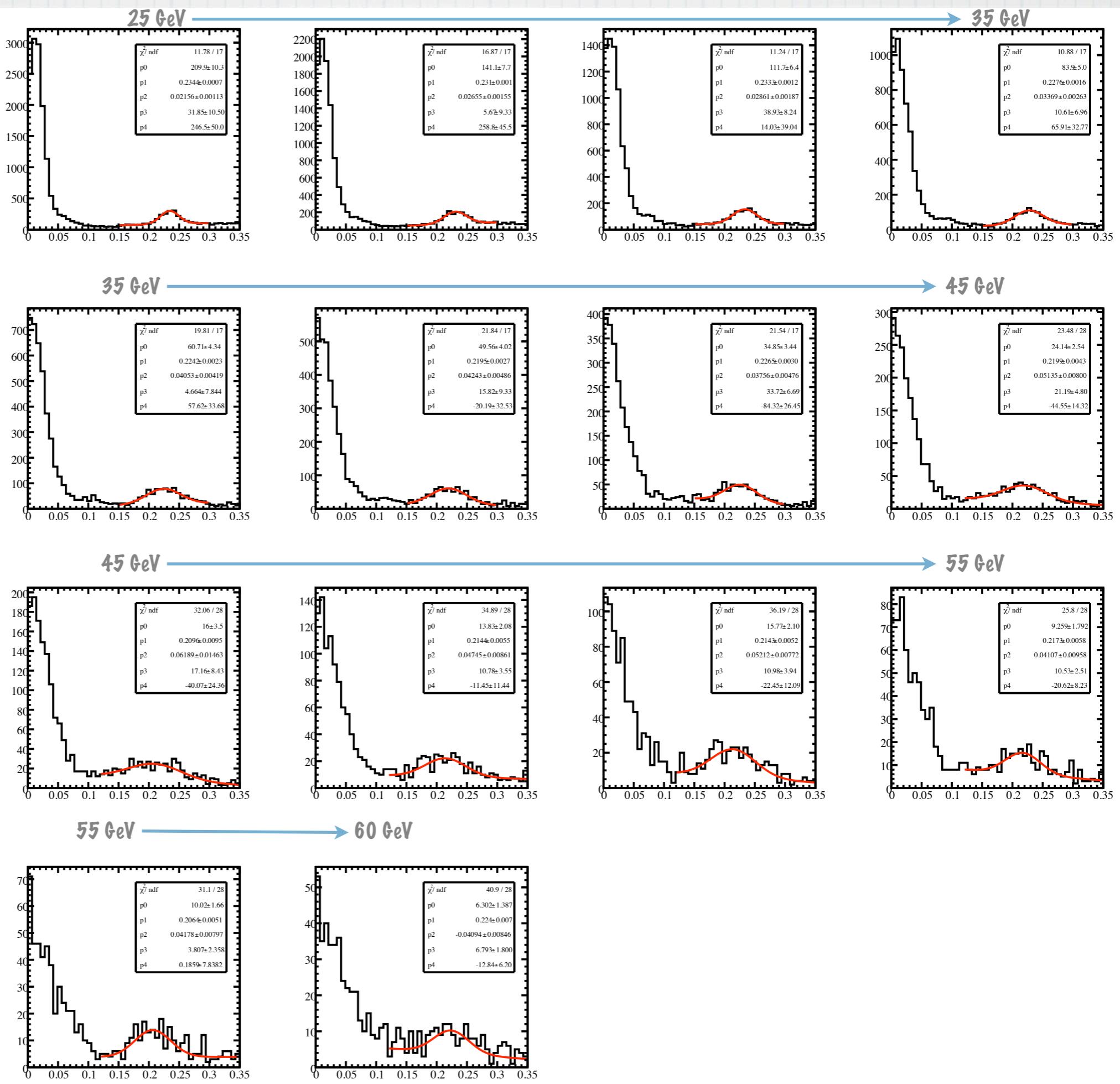
Protons from NuMI target Data

Plots show RICH m^2
for slices of
momentum ranging
from 40 to 80 GeV in
bins of 2.5 GeV with
fits to Gaussians.



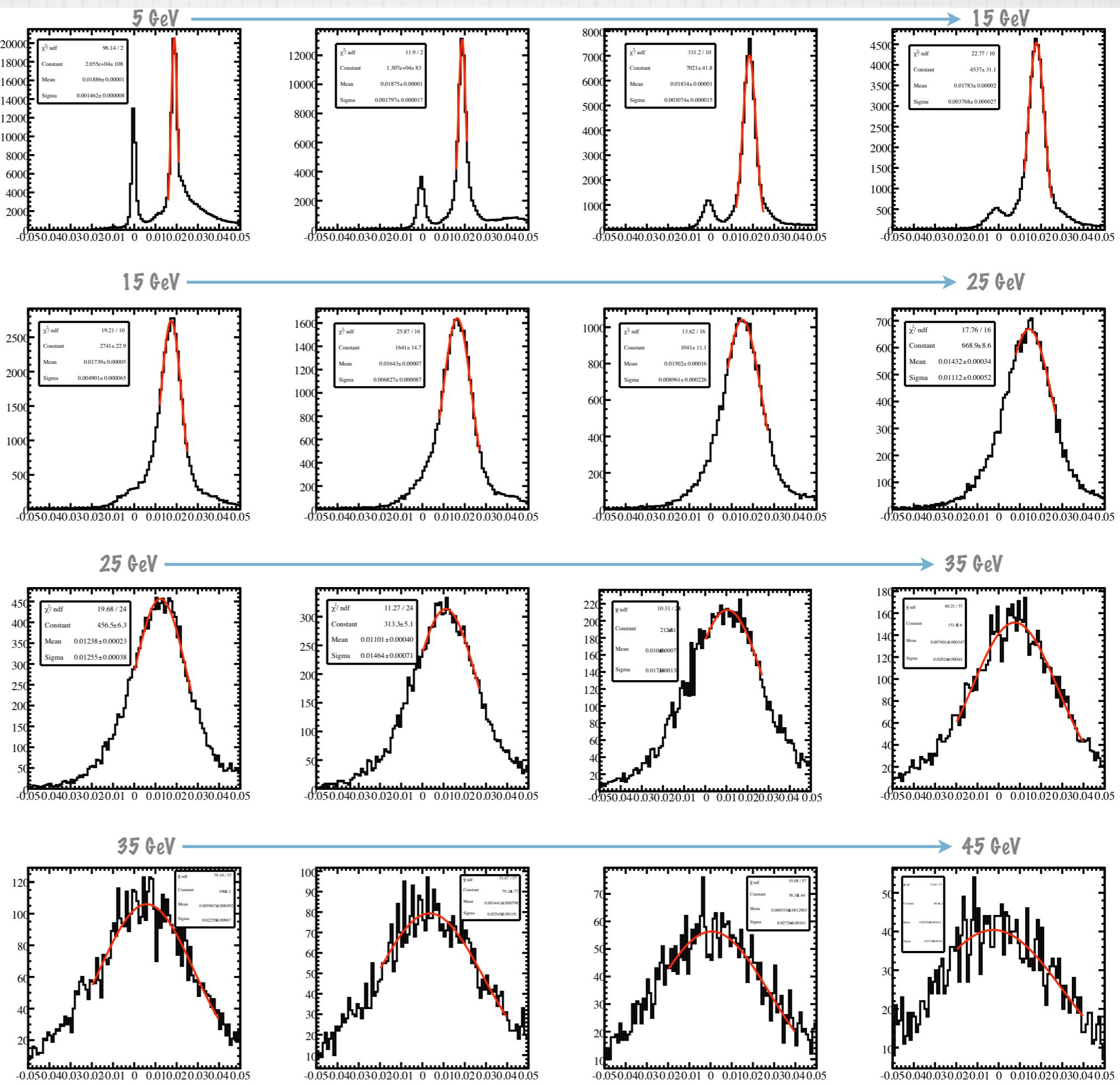
Kaons from NuMI target Data

Plots show RICH m^2
for slices of
momentum ranging
from 25 to 60 GeV in
bins of 2.5 GeV with
fits to Gaussians.



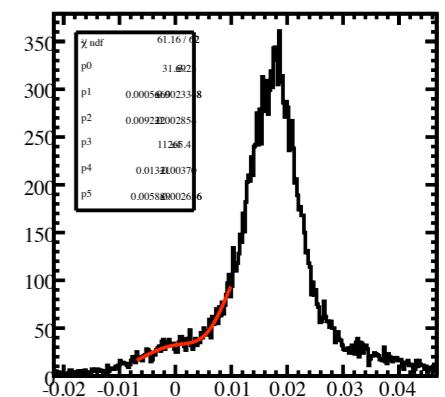
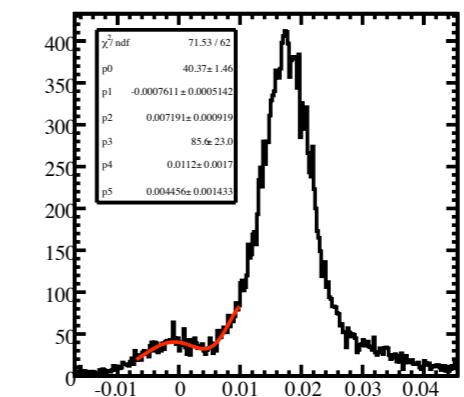
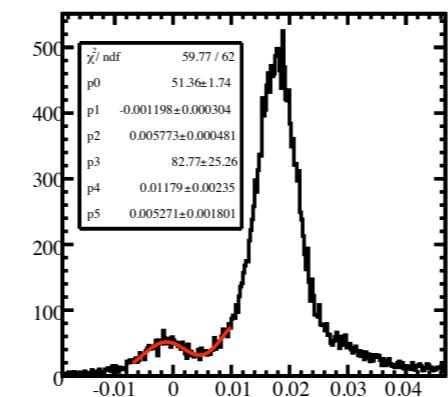
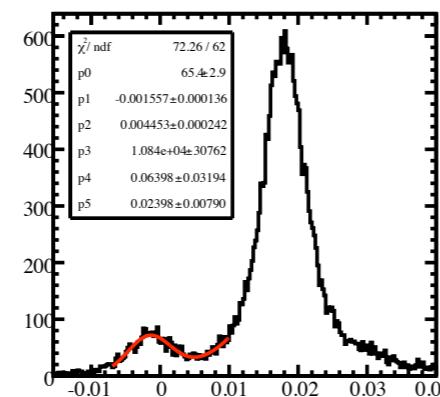
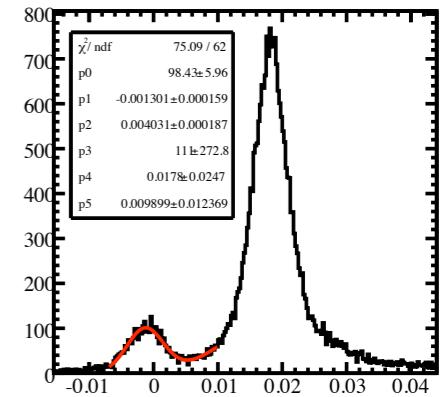
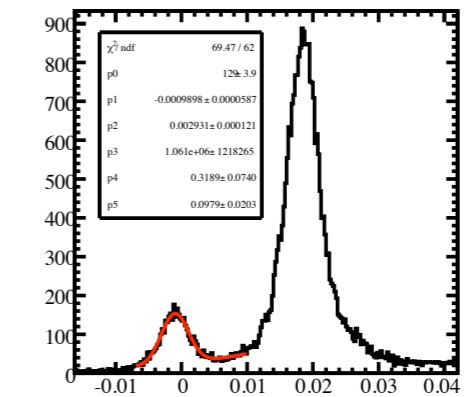
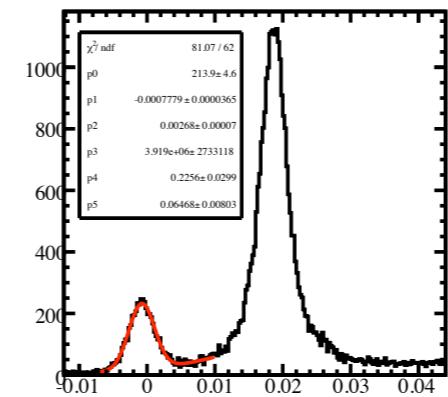
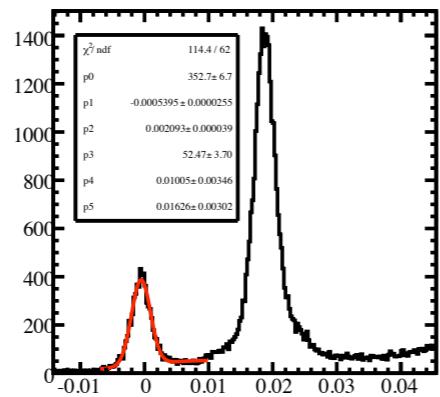
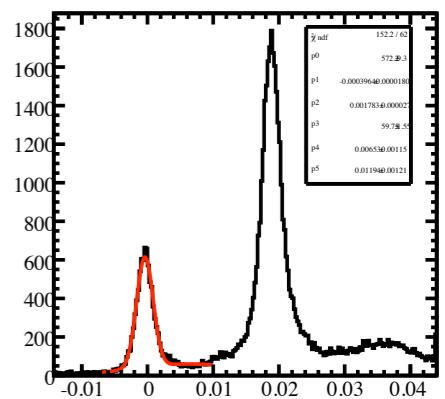
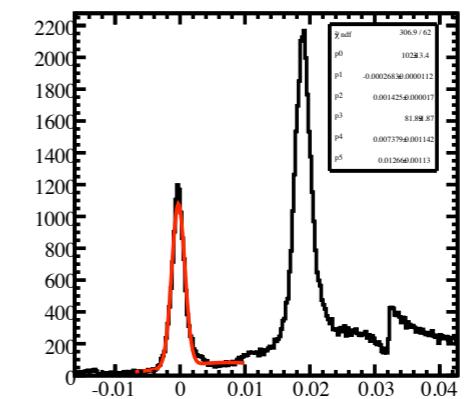
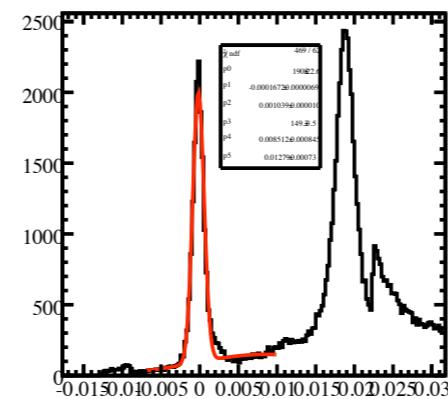
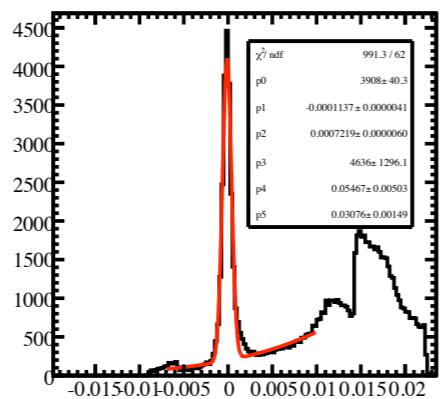
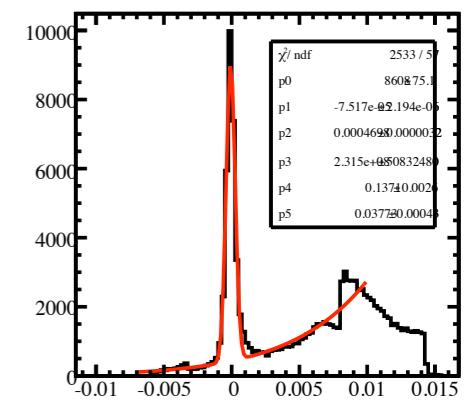
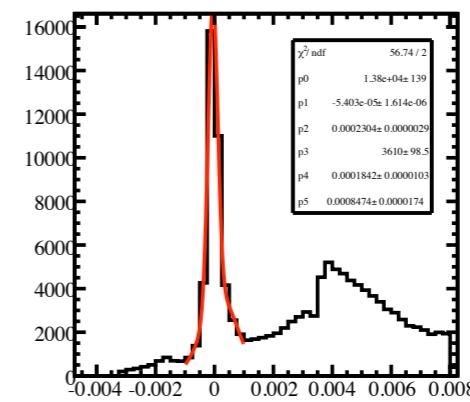
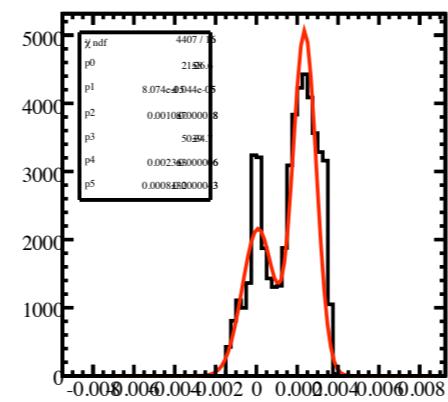
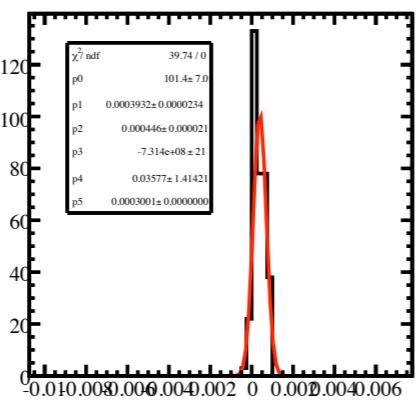
Pions from NuMI target Data

Plots show RICH m^2
for slices of
momentum ranging
from 5 to 45 GeV in
bins of 2.5 GeV with
fits to Gaussians.



Electrons from NuMI target Data

Plots show RICH m^2
for slices of
momentum ranging
from 25 to 60 GeV in
bins of 2.5 GeV with
fits to Gaussians.



NuMI “raw” peak locations vs. momentum

